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THE FACADE OF THE TEMPLE OF APOLLO, NEAR MILETUS*

ABOUT 10 miles to the south of Miletus was situated the temple of the Didymæan Apollo, famed for its oracles and ranking as the largest and most highly decorated of the Ionic temples in Asia Minor. A sacred way led from the temple to the sea and in early days was lined on either side by seated statues. Several of these archaic statues are now to be seen in the British Museum. Of the old temple nothing now remains. The Persians seem to have thoroughly swept it from the face of the earth and transported its statue to Ecbatana. The existing remains belong to the new temple, the date of which is now under discussion.

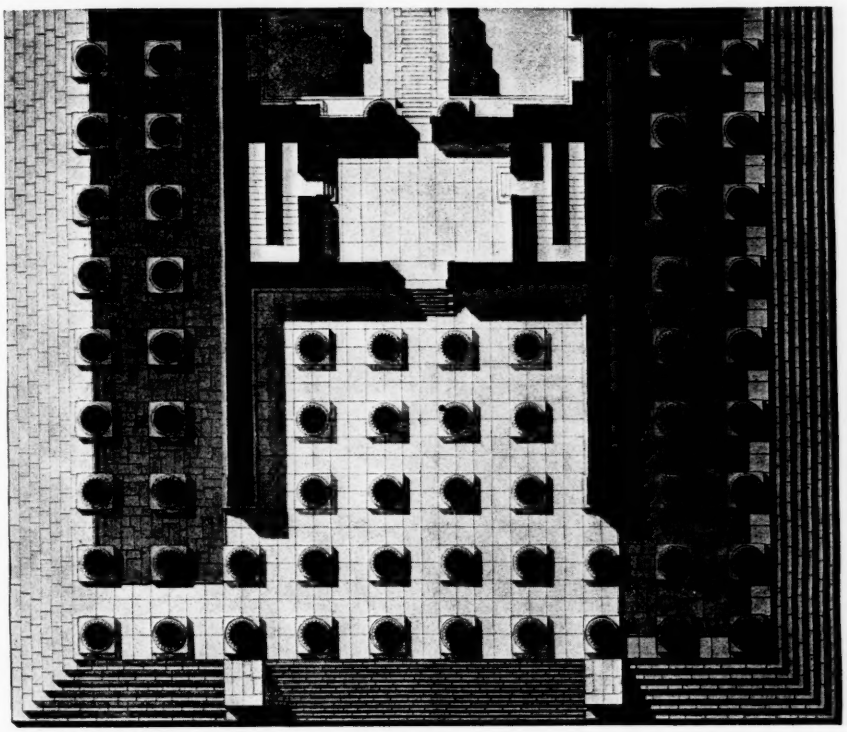
As one approaches the temple from the sea 3 columns stand out prominently against the horizon. Two of these (Fig. 7) are from the inner row of the north peristyle. Their shafts are fluted; their capitals are not of an early type, but approximate the form described by Vitruvius. They carry a ceiling beam with its double fascia and the lower portion of one of the cofferings. The third column, from the inner row of the south peristyle, is unfinished. Its shaft was never fluted. Our first view of these columns from a nearer standpoint was obtained at moonlight. Most impressive were they, like lonely sentinels, the only survivors of 120 columns that once surrounded the temple or stood within its porch. Early the following morning we obtained a better view of the facade as shown by the excavations of Haussoullier (Fig. 1).

*Read at the meeting of the Archæological Institute of America.

Here we see a disposition of peculiar character. Directly in front of the pronaos the steps are multiplied so as to facilitate ascent to the temple. These front steps are framed on either side by pylons or walls, which are not found at the extremities of the platform, as at Teos and in many Roman temples, but are situated in front of the side walls of the pronaos. Amidst the ruins we observe finely carved bases of columns, Gorgon heads, and decorated dentils.

The plan of the facade (Fig. 2) shows that the temple was decastyle dipteral or was surrounded by a double row of columns and had 10 columns in front. The deep pronaos resembled an Egyptian hypostyle hall in having as many as 12 columns to support its ceiling. The pronaos led to a room called in the inscriptions the Chresmographion, or hall for consultation of oracles. On either side of this room, steps led to upper chambers. Beyond it a stairway led down to the long naos, the central part of which was open to the sky, while at the rear was a covered shrine for the statue of Apollo.

Our attention is directed especially to the sculptured bases and to the decorated frieze. At the extreme right and left end of the facade the bases exhibit the typical Ionic form with the fluted torus, the double trochilus and plinth (Fig. 3). Of this character were all the remaining bases of the pronaos and of the peristyle, with the exception of 8 bases of the facade. The second base from either extreme (Fig. 4) had the upper torus elaborately adorned with variegated palmettes arranged *dos-a-dos*. Between this and the plinth is a cylindrical drum ornamented with a double mæander, enlivened at regular intervals by squares containing rosettes. The combination of rosettes and mæanders might make us think of Egypt, were it not that a very similar mæander pattern is still to be seen on several blocks of a frieze at Ephesus, which once adorned the walls of the temple of Artemis. The third base from either end is represented by a well-preserved example in the Louvre. Here for the upper torus is substituted a cylindrical band beautifully ornamented with a floral scroll. The lower torus presents on its upper half a charming palmette and lotus design. The lower half is not ornamented. The fourth base from either end presents a still more novel form (Fig. 5). The upper torus is adorned with laurel leaves. Between this and the plinth is a dodecagonal block, each face of which is charmingly ornamented by variegated palmette patterns or by Nereids and other creatures of the sea. The two central bases (Fig. 6) are harmonized with those of the extremes by having the double trochilus and with the remaining bases of the facade by substituting for the upper torus a cylindrical band ornamented with a conventional but dignified palmette and lotus pattern. If we should arrange these bases in order we could hardly fail to be impressed not only by their individual and varied character, but by the rhythmical alternation of forms. Was there ever a temple facade, except that of the Artemision at Ephesus, to the bases of the columns of which the architects had given so much careful thought?



PLAN OF THE FACADE OF THE TEMPLE [FIG. 2]

If we turn from the bases to the capitals, the same attempt to produce new and striking forms at once appears. The capitals of the terminal columns were probably of the normal Ionic type, like those of the 3 standing columns. But some at least of the remaining capitals were quite different in form, as is evident from sculptured fragments which still exist. One of these presents the head of Zeus (Fig. 8), another the head of an ox, a third the head of Apollo. The heads of Zeus and of Apollo emanate from that portion of the capital usually occupied by the volute; the ox-head was a central ornament between the lateral heads. Possibly with Zeus was associated a head of Hera, possibly with Apollo was a head of Artemis. Other divinities were doubtless represented, especially Poseidon and Amphitrite. But such other heads have not been found. That the Greeks of Ionia were willing at an early date to give up the volute and substitute some other form may be seen from an archaic capital from Ephesus now in the British Museum, in which large rosettes take the place of the lateral volute. In the Apollo temple, however, we have a very significant example, if not the earliest, of the introduction of anthropomorphic forms in the place of the stereotyped volute of the capital.

BASE WITH CHANNELLED TORE
[FIG. 3]

Nor can one leave this interesting spot without feeling the piercing gaze of the colonial Gorgon heads (Fig. 9) which have been brought to light in the excavations of Haussoullier. The blocks to which these belong are cut so as to interlock with other blocks and form a frieze. It is evident that we have here the frieze of the external order of the facade, decorated with Gorgon heads, probably one over each column and connected by large floral scrolls. With the exception of some ornamented dentils no remains of a cornice were found. Haussoullier therefore restores the facade (Fig. 10) without a gable. This is again a new and striking form, in comparison with the long line of gabled temple fronts which we meet with throughout the whole history of Greek architecture.

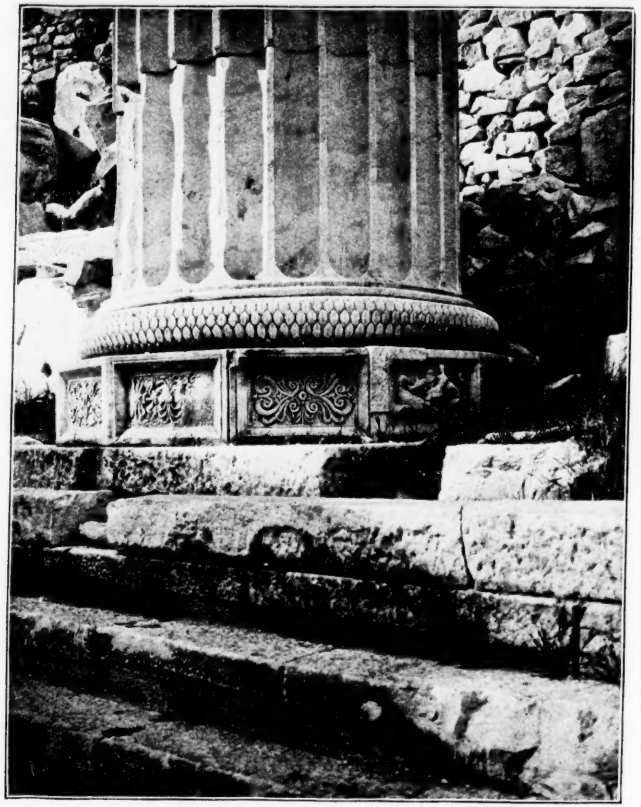
The special problem with which we are here concerned, not so much with the expectation of securing an immediate solution as for the sake of stimulating further inquiry, is what date is to be assigned to the facade of this temple of Apollo.

Three solutions have been already offered, which we may designate by the names of their authors, as—

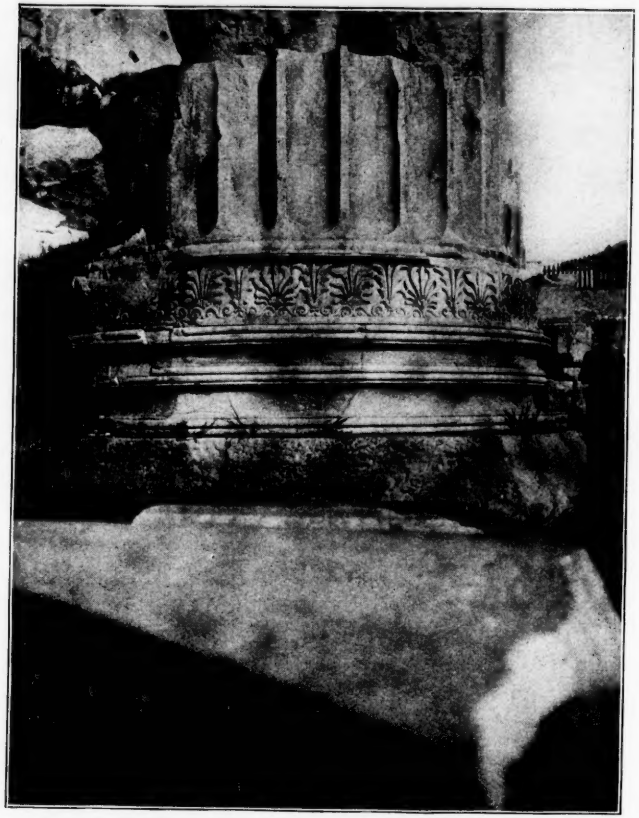
(1) That of Rayet, who assigns it to the IV Century B. C.
(2) That of Haussoullier, who assigns it to the II Century B. C.
(3) That of Wernicke, who assigns it to the I Century A. D.

(1) RAYET'S THEORY

Rayet and Thomas spent the summer of 1873 in digging trenches at this temple. Rayet's theory may be found in the *Gazette des Beaux Arts,* April, July, September, 1876, republished in his *Etudes d'Archeologie et d'Art* in 1888; also in his important work, *Milet et le Golfe Latmique,* 1880-1885. It is based primarily upon historical, and, secondarily, upon artistic evidence. The historic foundation of his theory is that Darius in 494 B. C. (or Xerxes after the battle of Mycale in 479 B. C.) burned the old temple of the Branchidæ and transported to Ecbatana the statue of Apollo. This statue was restored by Seleucus I, who reigned from 295-281 B. C. Rayet holds that the reception of a



BASE WITH DODECAGON [FIG. 5]



BASE WITH PALMETTES [FIG. 6]

temple statue would have been impossible and have been regarded as an act of impiety by the Greeks unless the temple were already rebuilt. As this rebuilding seems not likely to have occurred under the immediate successors of Alexander, he assigns it to the period immediately preceding the year 334 B. C., when Alexander the Great made an attack upon Miletus.

It may be noted in passing that it is a pure assumption that the entire temple, including its facade, must have been erected before the return of the statue. A shrine for the statue and some means of communicating his oracles might well have been provided long before a temple of such magnitude could have been reconstructed.

The secondary evidence on which Rayet relies is the style of the sculptured bases. He is strongly impressed by the superior quality in the decoration, especially of the floral scrolls (rinceaux). The composition of these he remarks reveal "a richness of imagination, a sentiment of nature, a liberty of design which Roman art never approached, even from afar." Again he compares these floral scrolls at Didyma with those from the Forum of Trajan in Rome. Although the latter do not lack real and majestic beauty he finds them heavy and overwrought in comparison with the Greek work, which is sober, elegant, rich.

In reply to this we may remark that superiority of workmanship is always a difficult criterion to apply in judging of the age of a building and that it by no means follows that these beautiful scrolls found in Asia Minor were necessarily 500 years older than somewhat similar work in Rome. I would call the attention of our Roman archæologists, not so much to the differences as to the resemblances of Trajan's work to the architectural sculptures of the Didymeion. Besides the floral scrolls we find in the sculptures from Trajan's forum griffins of the leonine and griffins of the eagle headed type, facing each other in Asiatic fashion, before a central object. Griffins of both types, protectors of Apollo, are figured on the pilaster capitals from the naos of the Didymeion. Everyone who has seen the Trajan relief in the Lateran Museum will remember the beautiful winged Cupids, with carved wings, the lower portion of their bodies vanishing into acanthus scrolls. On the very shrine of the Didymæan Apollo is figured a winged woman, whose body, Daphne-like, similarly terminates in long, swinging acanthus scrolls. If again we turn our attention to the Temple dedicated to Trajan at Pergamon we find a remarkable, though not strikingly beautiful, frieze. It consists, like that at the Didymeion, of a series of Gorgon heads. The indications of development and of degeneracy are sufficent to enable us to infer, not that all these monuments are contemporaneous, but that Trajan's architects and sculptors caught some at least of their inspiration from the temple of Apollo near Miletus, perhaps at that time in his reign when the Via Sacra from Miletus to Didyma was being constructed.

(2) HAUSSOULLIER'S THEORY

Haussoullier, aided by M. Pontremoli, laid bare the entire facade of the Temple in his campaign of 1895 and especially in that of 1896.

GORGON HEAD FROM FRIEZE [FIG. 9]

BASE WITH MAEANDER ORNAMENT [FIG. 4]

He published an account of his discoveries in the *Rev. de l'Art Ancien et Modern,* 1897, and his theory of the date of the facade is exposed more carefully in his *Etudes sur l'histoire de Milet et du Didymeion,* published in 1902, and in his *Didymes,* published in 1904.

His theory may be summarized as follows: The reconstruction of the temple (destroyed in 494 B. C.) was not begun until after the siege of Miletus in 334 B. C. Soon after 334 Paionios of Ephesus and Daphnis of Miletus furnished plans and perhaps a model for the temple. The work of restoration began with the adyton, which was in a condition to receive back the statue by Canachus in 295 and to furnish laurel for a crown for Seleucus II in 246 B. C. The walls of the prodomos and the great doorway were not erected until the early years of the II Century. The foundations of the facade, as shown by the mason marks, belong to the same building period. Hence to this period, ending c. 150 B. C., belong the bases and capitals of the columns of the facade. The frieze and dentils, being in his estimation of inferior design and execution, are assigned to the time of Caligula, 37-41 A. D.

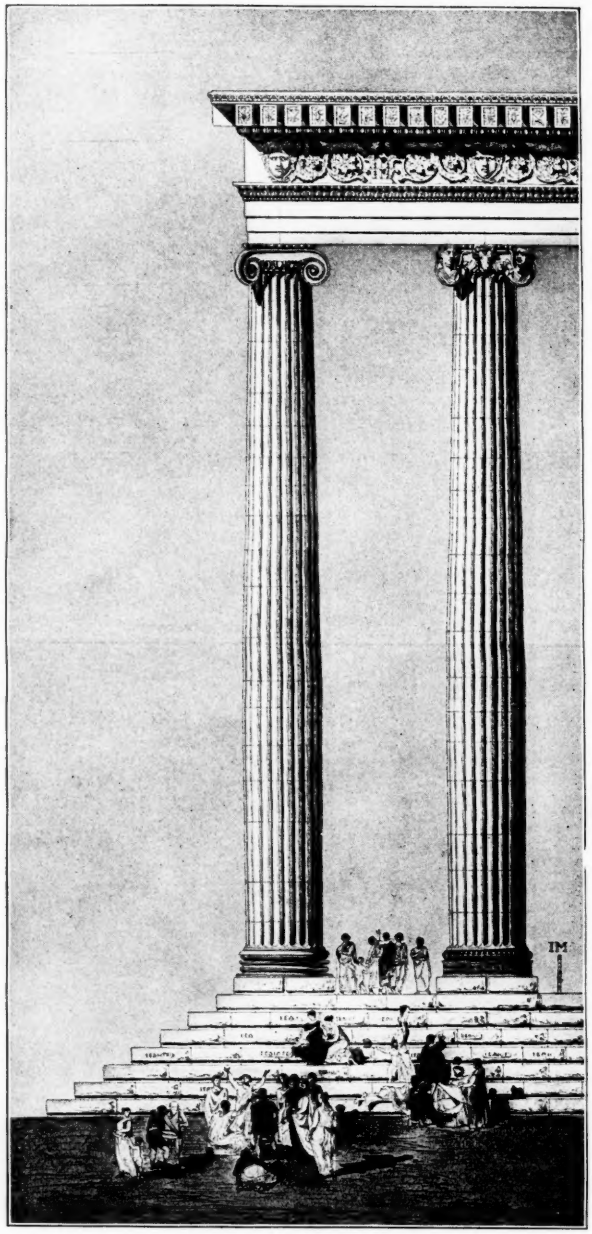
It is impossible here to examine in detail Haussoullier's theory. It is enough to say that the evidence upon which he relies most is obtained from inscriptions discovered in the course of his excavations. These inscriptions, though containing much interesting information concerning the building are not absolutely conclusive concerning the date of the facade. The mason marks which are found on the steps of the facade agree in the style of the lettering and contain at least two names identical with those found in inscriptions relating to the building of the rear wall of the prodomos and of the principal doorway. The lettering presents certain late forms, which, according to Haussoullier, could not have occurred in the IV or even in the early III Century, but might well be found in the early II Century. Several of the inscriptions are dated with reference to the time when a certain Menodoros held the office of stephanephoros. Now the date of Menodoros is approximately known, he having been stephanephoros during the reign of King Prousias. This king is supposed to have been Prousias II, and his offerings to the Didymæan Apollo to have been made immediately after he had defeated Attalos II and driven him back to Pergamon in 156-154 B. C. To the inscriptions concerning the wall and doorway of the prodomos Haussoullier assigns accurate dates, ranging from 171 to 168 B. C. These inscriptions, though they contain the names of two architects, Maiandrios, son of Thrason, and Kratinos, son of Minnion, are silent concerning the columns and entablature of the facade. Haussoullier assumes that these must have soon followed the building of the prodomos, and accordingly he assigns the columns to the period ending 150 B. C., and supports his assumption by the general resemblance which the heads of Zeus and Apollo bear to the sculptures of the Great Altar at Pergamon, erected at this period by Eumenes II. In this contention he is supported by Collignon, who [*Pergamon,* p. 219] asserts that these figured capitals from Didyma

TWO COLUMNS FROM THE INNER ROW OF THE PERISTYLE [FIG. 7]

belong to the II Century and can be but a few years younger than the Gigantomachia from the Great Altar.

(3) WERNICKE'S THEORY

The style of the sculptured capitals, and especially that of the head of Zeus, leads us to the third theory, suggested by Konrad Wernicke



RESTORATION OF PART OF THE FACADE [FIG. 10]

(in the 4th ed. of Müller - Wieseler, *Antike Denkmäler zur griechischen Götterlehre,* 1899, p. 31). He calls attention to this head of Zeus as having lost the calm reserve of the classic type, affirming that before the Hellenistic period such baroque striving for external effect is inconceivable. It is possible, he says, to date this head from the Roman imperial period from its resemblance to the sculptures of Damophon from Lycosura and from the Roman practice of decorating the capitals of temple columns with the heads of gods. Thus he concludes the columns would belong to the period when Caligula began the completion of the temple.

In our estimation the resemblance to the Lycosuran sculptures is of a most superficial kind, and even were the resemblance stronger the date of Damophon and of his sculptures at Lycosura is far from certain—(Kavvadias, E. Gardner, Waldstein, IV Century B. C.; Collignon, II Century

B. C.; Robert, Overbeck, II Century A. D.). Why look to an obscure town in Arcadia for similar monuments when much stronger analogies may be found in the well-known sculptures from Pergamon?

Now that we have before us the essential features of these 3 solutions, it remains for us to give a brief estimate of their value. Rayet's theory was enunciated before the discovery of the capitals and of the frieze. The decoration of the bases of the facade and that of the pilasters from the interior of the temple are in themselves so admirable that one might easily associate them with the decorative architectural sculptures of the IV Century. But now that we have before us the heads of Zeus and Apollo and the Gorgon frieze, with their obvious Hellenistic affinities, it is impossible longer to think of assigning this facade to the IV Century. But even if we cast aside the sculptured capitals and frieze and compare only the bases with other IV Century bases from Asia Minor, we reach the same result. From the Antemision at Ephesus Paionios and Daphnis may well have derived the typical Ionic base, with its channelled torus, its trochili and its plinth; or they might have borrowed it from the Athena temple at the neighboring city of Priene, or from the Mausoleum at Halicarnassus—both works of the celebrated architect Pythios. But from none of these sources came that somewhat indiscriminate though interesting use of various forms and varied decoration that characterize the bases of the temple of Apollo.

There was indeed the temple of Artemis at Magnesia on the Mæander, built by Hermogenes in the closing years of the III Century [*Magnesia am Mæander*, p. 164]. Here we find bases with their torus mouldings variously decorated with laurel leaves and an evident intention to produce an effect by a rhythmical alternation of decorative motives. But this is but a timid effort, full of classic reserve, as compared with the developed freedom exhibited at the Didymeion.

Wernicke's theory that Caligula might have built this facade is enunciated quite casually in order to support a timid reference of the Zeus head to the imperial Roman period. It is true that in Roman monuments of the Early Empire we find many examples of decorated bases, of figured capitals, of floral scrolls in friezes, of griffins and other motives that prevail in this temple. It is also true that there are occasional indications of Roman workmanship at the Didymeion, e. g., the appearance in one capital of the egg-and-spear, instead of the egg-and-dart, and the discovery in one column of a bronze clamp signed in Greek characters, Publius. But Caligula's reign was too short, less than 4 years, to have allowed time for the erection of such a facade. It seems, moreover, likely that the facade was already erected before Strabo visited this temple during the reign of Augustus. He draws attention to the fact that the temple was without a roof, but says nothing as to its being without a facade.

Haussoullier's theory is, in our estimation, nearer the true solution. He added to the literary and historic considerable evidence from

epigraphic sources. This evidence, though it does not settle the question once for all, makes it extremely improbable that the facade can be earlier than the II Century B. C. We are obliged, therefore, to let the architectural and sculptural evidence speak for themselves. Our opinion has already been foreshadowed that both the bases and the capitals of the columns belong to the Hellenistic period. We now go further and express our belief that the frieze also belongs to the same period. These strongly defined Gorgons belong to the class described by Furt-

ZEUS HEAD FROM CAPITAL OF A COLUMN [FIG. 8]

wängler as the *pathetic* type, and known to be of Hellenistic origin. Roman Gorgon heads—such as those that decorate the frieze of Trajan's temple at Pergamon—are like lifeless imitations when compared with these vigorous masks of the Apollo temple. It is more difficult to estimate the style of the floral scrolls which filled the spaces between the Gorgon masks. But I see no good reason for assigning them to a period 200 years later than the scrolls upon the column bases. Nor need we be troubled by the cruder workmanship on the dentils.

The design of the floral ornamentation shows the same Hellenistic love of variety which we have found in the column bases—and the crude execution is not a necessary indication of a later period.

In conclusion, we may say that the entire facade, consisting of foundations, columns, and entablatures, belongs to one building period, probably not far removed from the year 150 B. C.

ALLAN MARQUAND.

PRINCETON UNIVERSITY, January, 1905.

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THE PHYSICAL CONDITIONS IN NORTH AMERICA DURING MAN'S EARLY OCCUPANCY*

THE discovery that man was in America before the close of the Glacial Period has led to many interesting conclusions concerning his primitive condition. The facts will be most readily comprehended by a preliminary statement concerning the extent of the continental glacier in North America during the great Ice Age, and the interesting condition of things connected with the final disappearance of the ice.

Briefly stated, the boundary of the glaciated area in North America runs through Long Island from east to west and onward across the mainland in an irregular line through Perth-Amboy, N. J., Easton, Penn., Salamanca, N. Y., Oil City, Penn., Canton, Chillicothe and Cincinnati, Ohio (crossing for a few miles into Kentucky), Madison, Martinsville and New Harmony, Ind., Carbondale, Ill., St. Louis and Kansas City, Mo. (crossing the Missouri River only in the western part of the state), Lawrence and Topeka, Kansas. Thence turning northward the line runs about 100 miles west of the Missouri River until reaching the Dakotas, where it bears westward again, crossing the Rocky and Cascade Mountains in an irregular course, reaching the Pacific Ocean in the vicinity of Tacoma.

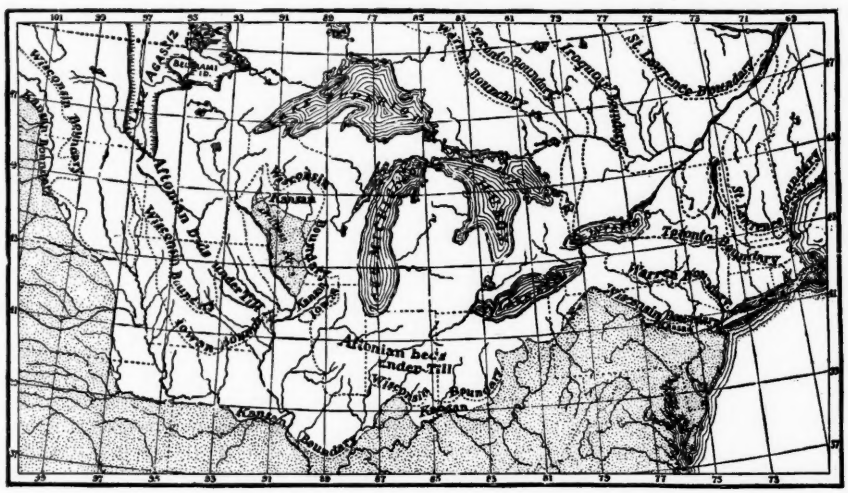
The centers from which this great confluent glacier radiated are found in Labrador, Hudson's Bay and British Columbia. The northwestern part of North America was not covered with a moving glacier, having been only partially invaded by the movement from the centers indicated. The depth of the accumulated ice over this area is known to have been more than one mile in the vicinity of the White Mountains, and was probably equally great over the whole area, which is approximately 4,000,000 square miles.

The fact that man was an occupant of North America during the existence of this ice sheet seems less startling than it otherwise would when we consider the condition of the natives occupying Greenland and Alaska at the present time. For, in Greenland, the Glacial Period

*Read at the meeting of the Archæological Institute of America.

still continues in full force—the entire continent of 500,000 square miles being enveloped with an icy covering of more than a mile in thickness, except a narrow margin on the western and southwestern border, which is occupied by the Eskimo amid conditions more forbidding than were those connected with the ice front, across this continent, as we have delineated it, while in Alaska the glaciers have not yet wholly retreated from the coast.

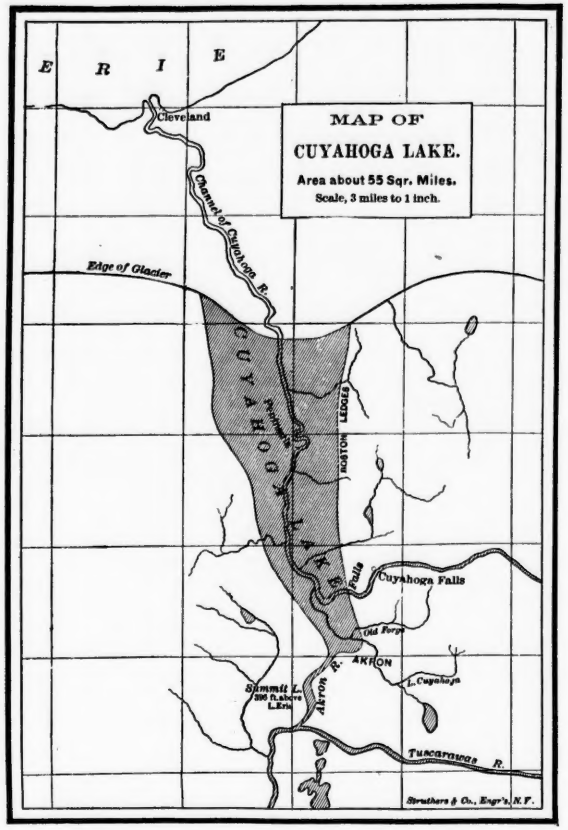
The specific evidence concerning man's connection with the glacial period in America pertains, however, to the later stages of the period when the ice was rapidly melting away and gorging all the south flowing rivers with floods of water beyond all comparison with anything known at the present day. It is in connection with these floods that the most interesting and, indeed, startling evidence has been derived.



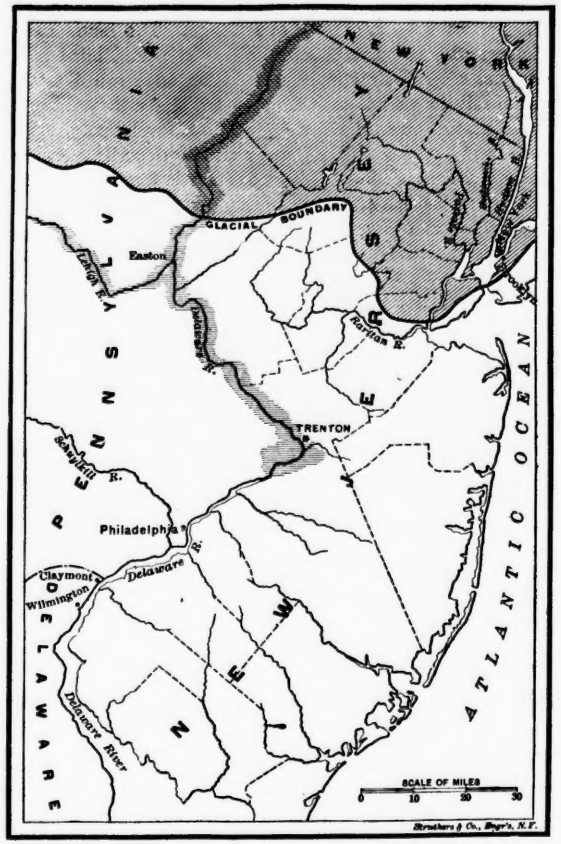
MAP SHOWING GLACIATION IN EASTERN AND CENTRAL UNITED STATES

The first indications of glacial man in America were found by Dr. C. C. Abbott in the undisturbed strata of the immense delta-terrace or gravel upon which the city of Trenton, N. J., is built. A large number of roughly chipped argillite specimens collected by Dr. Abbott at various depths in this gravel, may be seen in the Peabody Museum, Cambridge, Mass. Subsequently these discoveries were confirmed by the personal observations of Professors Putnam, Whitney, Shaler, and Carr, of Harvard University, but especially by the extensive explorations of Mr. Ernest Volk (under the direction of Professor Putnam), the greater part of whose discoveries may be found in the American Museum of Natural History in New York. Among the most convincing discoveries of Mr. Volk was that of a human femur found in undisturbed glacial gravel, fully 20 ft. below the surface.

With one or two exceptions all the implements found more than



MAP OF THE GLACIAL LAKE CUYAHOGA IN NORTHERN OHIO



MAP SHOWING THE RELATION OF THE GLACIAL TERRACES AT TRENTON TO THE GLACIAL AREA

one foot below the surface of this gravel were made of argillite (a metamorphosed slate stone outcropping near some trap dykes, not far away), and are of a palæolithic type. Everything indicates a most primitive condition of life, while the animal remains, so far as they have been discovered, were those now peculiar to a much more northern region. From the remains found in Eastern United States, it is clear that during man's earliest occupancy of the Delaware valley, he was associated with the extinct mastodon and the mammoth and with the walrus, the Greenland reindeer, the caribou, the bison, the moose, and the musk-ox, none of which are now found in that vicinity and the most of which long since retired to the far north.

Reproducing, so far as we can, the conditions accompanying the deposition of the Trenton gravel, in which these remains of man are found, they are as follows: The great Continental glacier having slowly moved southward to Belvidere, near Easton, Penn., on the Delaware River, at length, under changing climatic conditions rapidly melted away, pouring immense floods of water into the trough of the Delaware, and at the same time setting free a vast amount of boulders, pebbles, gravel, and sand, which had been ground up and incorporated with the ice. This material was swept through the rocky gorge of the Delaware, which descends with a gradient of 3 or 4 ft. to the mile, to its mouth at Trenton, where it meets the tide-water. Here, upon the checking of the current, the coarser sedimentary material was deposited in a series of annual overflows, which gradually built up the delta-terrace in which the relics of man have been found.

The conditions were, however, by no means so impossible or forbidding as might at first seem. All the land south of the glacier was covered with forest and vegetation affording support to varied animal life, as in Alaska near the Muir glacier, at the present day. The glacial floods were periodical and of short continuance, slowly reaching their maximum in August and rapidly declining in the autumn, leaving for 9 or 10 months of the year an exposed gravelly beach, over which man could freely wander. It was at such times, we suppose, that his implements were occasionally lost, to be buried beneath the deposits of the subsequent floods. The large number of flakes and chips scattered through the deposits would indicate, moreover, that man resorted to this area to get the material, found in the pebbles brought down by the river, from which to manufacture his rude implements. His habitations, meanwhile, were to be found in the adjoining forests. But of these no remains have as yet been discovered.

In the Mississippi Valley implements similar in character, but differing in material, have been found by Mr. Sam Houston; in the glacial terrace of the Ohio River at Brilliant, near Steubenville, by Prof. W. C. Mills; at New Comerstown on the Tuscarawas, and by Dr. C. L. Metz, working in connection with Prof. Putnam, at Madisonville, near Cincinnati, Ohio.

In all these places the picture of the conditions surrounding glacial man is similar to that already drawn of those in the Delaware valley.

BURIED FOREST NEAR THE MUIR GLACIER, ALASKA

Floods of water beyond all estimate from the melting ice swelled the streams to an enormous height, annually leaving high exposures of gravel deposits upon which, coming down from his forest habitation, he could wander freely for the most of the year.

More interesting conditions, still, were found along the extensive water-shed which separates the Mississippi Valley from that of the Great Lakes and the St. Lawrence. Edward Everett Hale has asked me for a locality in which to lay the plot of a novel which he proposed some time ago to write, but which, unfortunately, has not yet been written. We are free, however, to give it to aid any novelist who may take up the subject. The plot was this: A brave young chieftain of one Indian tribe is violently in love with a dusky maiden of another tribe. But her fellow tribesmen declare that, until the rivers change their course and the water which is now flowing to the south shall turn to the north, he may never be permitted to claim her hand.

Now, at Akron, Ohio, and indeed at many other places along the water-shed, precisely this phenomenon did occur. Until the ice-front had melted back to this water-shed south of Lake Erie the whole drainage of the basin of the Great Lakes poured over through numerous outlets into the Mississippi basin, while for some time after it had melted back north from Akron (where the altitude is 500 ft. above Lake Erie) the ice still obstructed the lower pass at Ft. Wayne, leading into the Wabash River. But as soon as the ice had melted back from

Ft. Wayne the water which had accumulated in front of the ice, was drawn off in that direction, so that the glacial stream at Akron flowing south to the Tuscarawas was dried up and the Cuyahoga began to flow in its present course toward Cleveland, to the north.

In further justification for selecting this scene for the plot, we may say that Prof. E. W. Claypole, than whom there has been no more competent observer, satisfied himself that human implements had been found in the north side of this water-shed, near Harrisville, in deposits which were made after the ice had melted away some distance back of it, and while these temporary glacial lakes in front of the ice which characterize that stage of its recession, were still in existence.

Other scenes might be laid in various places in central New York along the water-shed between Lake Ontario and the Susquehanna, or indeed on the banks of the Niagara before the glacial ice had melted away from the Mohawk Valley. Indeed Dr. Gilbert has described a collection of human relics in the high terrace ridge bordering Lake Ontario, which seem to mark the period when the drainage of the basin was over the pass at Rome, N. Y., into the Mohawk Valley, previous to the melting away of the ice which obstructed the course of the St. Lawrence.

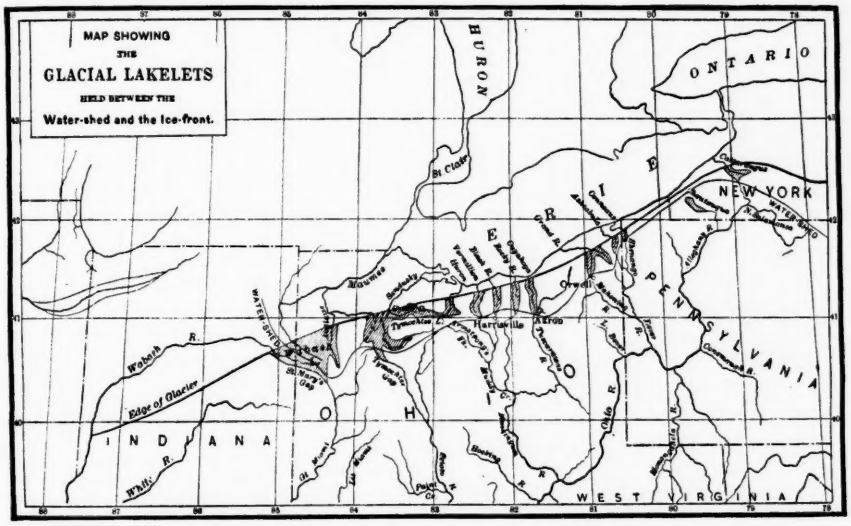
An even more impressive scene for the plot might be laid in Brown's Valley, between the Red River of the North and the Minnesota River, where for a thousand years or more the pent up waters of Lake Agassiz, which had accumulated in front of the retreating ice border south of Hudson Bay, poured over in a majestic current into the valley of the Mississippi. But at last there came a time when the barriers to the north were melted away and the Red River began its unobstructed flow toward the Arctic regions.

In many respects the most instructive and interesting discovery of the remains of man connected with the Glacial Period was that made at Lansing, near Leavenworth, Kansas, in 1902, by Mr. Concannon and brought to the knowledge of the scientific world by Mr. M. C. Long, of Kansas City, in whose possession the relics still remain. The discovery consisted of the remains of 2 human skeletons, lying in undisturbed deposits at the base of the bluff of loess, which in this region borders both sides of the Missouri Valley. That these 2 skeletons were found beneath the original deposition, and where it has been undisturbed, has been clearly and conclusively shown by the final report of Prof. N. H. Winchell in the "American Geologist" for May, 1903. A more summary account is given with illustrations in RECORDS OF THE PAST for April, 1903.

Our attention is therefore directed to the conditions surrounding man in the Missouri Valley during the time of the deposition of the loess. Now, by all authorities, it is agreed that the loess of the Missouri Valley, is a deposit connected with the closing stages of the Glacial Epoch in the central part of the Continent; so that here again is fresh evidence of Glacial Man in America. But investigations of

my own in 1903 (see full account in *The American Geologist,* May, 1904) have brought to light a new chapter connected with the early history of man, of surpassing and startling interest.

Largely owing to the difficulty of providing a proper supply of water it had been difficult for geologists to regard the loess of the Missouri Valley as a water deposit; and many were inclined to the theory that it was a wind deposit. One of the strongest arguments in favor of the wind theory was that the shells found in the loess were land species, though of a kind which generally loved moist places. My own investigations referred to proved, however, that for a considerable period during the closing stages of the Glacial Epoch while the loess was being deposited, the lower Missouri was subject to an annual rise of water, in the month of August, amounting to 200 ft., which was



followed for several months by a low stage of water, corresponding to a similar stage at the present time. The evidence of this condition of things is so easily presented and comprehended that we should not be forgiven if we fail to present it in a popular way.

By many competent observers it had been determined that the actual glacial invasion of Missouri had been limited to the northern half of the state, so that the lower part of the Missouri River, running through the state from west to east, had not been crossed by the continental glacier except in the western part of the state, near Kansas City. But, it was discovered by Dr. Ball, of the State Geological Survey of Missouri, that there were 2 or 3 clusters of Canadian boulders, some of them weighing several tons, occurring on low gravel terraces in the trough of the Osage River, near Tuscumbia, 65 miles above the mouth of the Osage River, and 40 miles south of the farthest actual extension of the continental glacier in that portion of the state. The

solving of the problem presented by those boulders is what led by irresistible steps to the conclusions already stated concerning the former enormous flood in the Missouri Valley.

They are 4, and only 4, theories by which it is possible to account for the presence of these boulders in the situation in which they are found.

(1) It might be thought possible that there were outcrops of granite in the Ozark region which could furnish the Tuscumbia boulders. But the granite outcrops in Southern Missouri are exceedingly limited and their composition is entirely different from that of these boulders; while Dr. Robert Bell, the Chief of the Canadian Geological Survey, at once recognized these fragments as of Canadian origin.

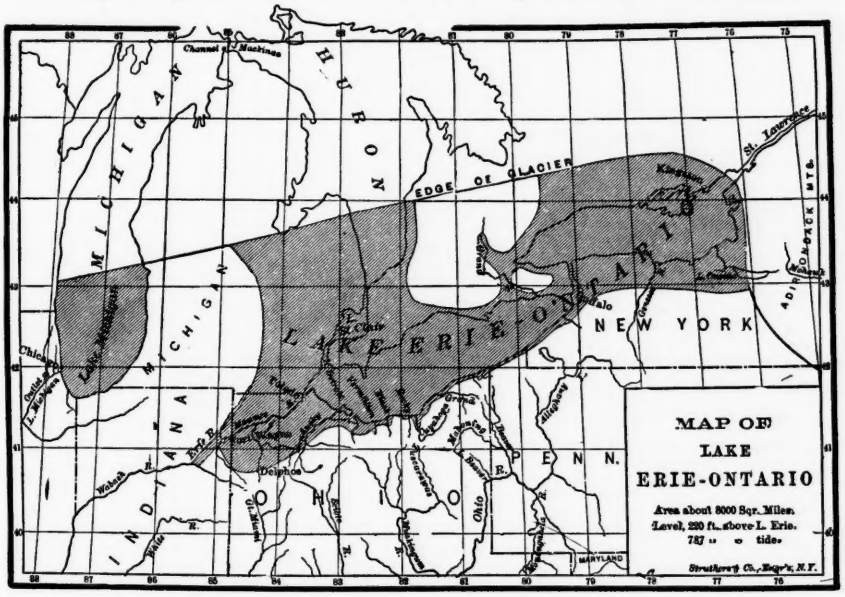
(2) It might be supposed that all the geologists who had investigated the region had been mistaken in limiting the advance of the continental glacier to the trough of the Missouri in this region. But, so many and so careful have been the observers (among whom were Prof. Todd, specially detailed to make the survey) that there could be no reasonable doubt upon that point. Nevertheless, to make things doubly sure I resurveyed the region south of the Missouri, between St. Louis and Jefferson City, with the same result that had been reported by the others. As fully as any negative proposition can be demonstrated, therefore, this has been, namely, that there are no signs of direct glacial action south of the Missouri River, between Jefferson City and the vicinity of St. Louis, where there was a brief invasion of ice coming over probably from the Illinois lobe. The boulders at Tuscumbia could not have been carried there by the direct movement of glacial ice.

(3) It might be supposed that the boulders were carried over on floating ice into the headwaters of the Osage River, south of Lawrence or Topeka, Kansas, and then transported down the stream to their present position. This region, therefore, had to be examined anew. It is true that glacial ice had at one time reached the Kansas River for a distance of 60 or 70 miles west of Kansas City, and that one of the principal tributaries of the Osage River runs parallel with it nearly the whole distance and only about 25 miles farther south. But an examination of the water-shed between these streams easily demonstrated that there had never been any extensive overflow from one valley into the other.

(4) There remains, therefore, only one other possible theory, and that the one which involved the enormous flood referred to in connection with man's early occupation of the valley. I remembered that at one time, a series of thunder showers produced floods of 30 or 40 ft. in Poultney River, Vermont, when there was no corresponding rise in Hubbarton Creek (one of the principal tributaries coming in from the north), so that as a consequence the water from the main stream set back into the creek, and carried a mill-dam upstream. It is a well known fact, also, that the Columbia River, in Oregon, often rises 40 or 50 ft. from conditions which do not affect the Willamette River. As a

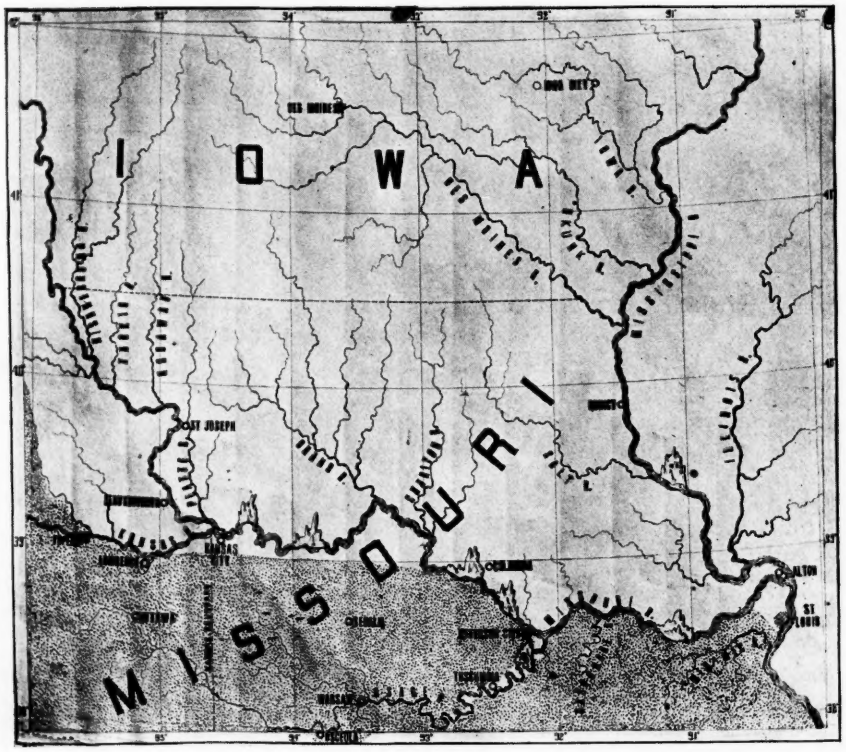
consequence the water sets back from the Columbia, producing an upward current in the Willamette and floating driftwood far above Portland.

A similar, though far more startling, situation existed during the closing stages of the Glacial Epoch between the valley of the Missouri and the Osage rivers. At the present time the Missouri River annually discharges 28 cubic miles of water. But during the closing stages of the Glacial Epoch fully 250,000 square miles of territory covered with melting ice, annually discharged its water into the Missouri. This may easily have amounted to 10 ft. a year, melted off each sum-



mer over the whole area, furnishing 500 cubic miles of water to be discharged by the river in the course of a single season.

Now, below the mouth of the Osage, the trough of the Missouri narrows to a width of only 2 miles. Through this narrow gorge, therefore, the 500 cubic miles of water annually accumulating above, would have to make its way, each summer and autumn. If the land level at that time had been the same as now, the rapidity of the current through the gorge would have been too great to have allowed it to rise 200 ft. But, as at that time the land in general, over the glaciated region was differentially depressed, being increasingly so toward the north, it is easy to conceive a gradient such that the pent up glacial flood would pass through the gorge no faster than 3 miles an hour. At this rate a current 2 miles wide and 200 ft. deep would carry off the 500 cubic miles of water in 90 days. But, since the supply of water would gradually increase until the latter part of summer and then as gradually diminish, the maximum depth of 200 ft. would obtain only a short time



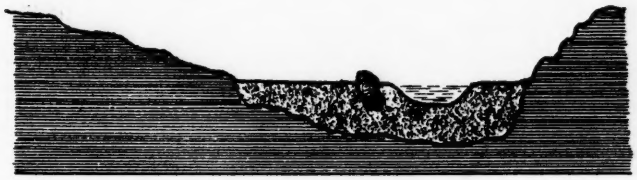
THE GLACIATED AREA IN THE LOWER MISSOURI VALLEY AND THE COURSE OF THE OSAGE RIVER

in August, while the average depth for the season would be no more than 100 ft., giving a flood period of 180 days with an equal annual period of low water. Thus in a most natural manner an annual flood of 200 ft. in the Missouri Valley may be accounted for.

In the valley of the Osage there would be no corresponding flood, since it lies entirely outside of the glaciated area. The consequence would be that the back water from the Missouri River would set up the Osage Valley (which joins that of the Missouri at an acute angle) until it reached the height of the flood in the Missouri. It would therefore be a most natural result that small ice-floes or icebergs bearing Canadian boulders, which were floating down the Missouri, should be carried by back water a long distance up the Osage, as was the case with the mill-dam in Hubbarton Creek. As the elevation of the terrace in the trough of the Osage River at Tuscumbia, in which these boulders are found, is only about 150 ft. above the Missouri, it is easy to see that they could have readily been brought there in this manner, on floating cakes of ice; and so the mystery is solved, and floods of the

Missouri River 5 times as high as the highest known in modern times, may be accepted as a fact during the earliest period of man's occupancy.

The supposition of such periodical floods helps to explain many other things connected with the loess deposits of the valley. Such floods would spread out in lake-like expansion over the entire upper valley below the highest level of the water and so account for the dis-



CROSS SECTION OF THE OSAGE TROUGH AT TUSCUMBIA, WITH A BOULDER

tribution of the loess for a long distance on either side of the trough, and for its diminution in extent and coarseness, as the distance increases from the river. Being, also, but a temporary overflow (after the analogy of an ordinary river over its flood plain) it would explain why only land shells are found in the loess; since the flood plain of a river furnishes just the conditions which snail shells of various sort especially delight in. Finally, it would explain why the accumulations of loess are specially prominent on the border of both sides of the trough of the river. Frequently the bluffs of loess upon either side of the river are 100 or more feet in thickness.

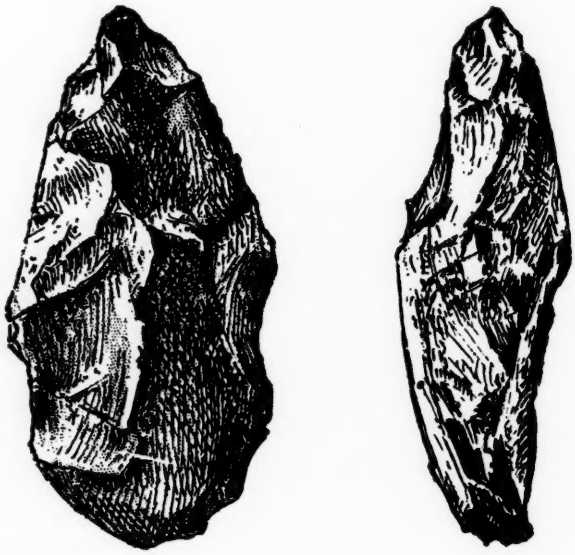
It was at the base of this deposit that the remains of man were found at Lansing. At other places in the vicinity the remains of the mastodon have been found in similar relation to the loess, showing that man with his strange animal associates witnessed these enormous swellings of the floods of the Missouri with their slowly moving boulder-laden floes of ice on their way to more southern climes. But in general his own habitation may have been as secure as at the present time, while the climate may have been by no means so severe as that of the regions in the north still occupied by the human race. Nor, impressive as it may seem to our imagination, was the scene of the waxing and waning of these floods much more mysterious and impressive than is that which is witnessed at the present time, in the Bay of Fundy, where the tide occasionally rises to the enormous height of 70 ft. in one day.

A concluding word will be in place concerning the date of the scenes of the Glacial Period with which man was connected in America. Until within the last few years the antiquity of the close of the Glacial Period was greatly exaggerated; but investigations concerning the extent of post glacial stream erosion over the area covered by glacial ice, and concerning the extent to which lakes and ponds have been filled up by sediment since that period, all point irresistibly to a shorter chronology than had previously been accepted for Glacial Man. It is

now about as certain as any historical fact can be, that the ice of the Glacial Period did not melt off from the Mohawk Valley in Central New York earlier than from 8,000 to 10,000 years ago, this date being deducible from the age of the Niagara gorge determined from the present rate of the recession of the Falls. We may also add that the position of the boulders on the low and limited terrace of the Osage River at Tuscumbia points conclusively to a date for the Missouri River floods which transported them and laid down the deposits over the Lansing man not much, if any, earlier than that assigned to the beginning of the Niagara gorge.

Thus it comes about that when we speak of Glacial Man in America, we do not necessarily imply an antiquity any greater than that which is now assigned to his more civilized brethren in Egypt and Babylonia. For all we know, and indeed, from what we seem actually to know, mankind at the close of the Glacial Period existed amid as great diversities of civilization as he does at the present day; while the climatic conditions under which he existed need not have been much more diverse than those which now prevail in some parts of the habitable world.

GEORGE FREDERICK WRIGHT.



A. B.

CHIPPED PEBBLE OF BLACK CHERT, FOUND BY DR. C. L. MERTZ, OCTOBER, 1885, AT MADISONVILLE, OHIO, IN GRAVEL 8 FT. FROM THE SURFACE UNDER CLAY. A, FACE VIEW; B, SIDE VIEW

EDITORIAL NOTES

THE MEETING OF THE ARCHAEOLOGICAL INSTITUTE OF AMERICA

THE XXV anniversary of the founding of the Archæological Institute of America, observed in Boston, December 28, 29, and 30, 1904, was rendered noteworthy by the presentation of a large number of specially interesting and instructive addresses and papers. The meetings were presided over by Prof. Thomas Day Seymour, President of the Institute, Mr. Charles P. Bowditch, of Boston, and Mr. Edward Robinson, of the Museum of Fine Arts, Vice-Presidents, and by Prof. John Williams White, of Harvard University, Honorary President.

According to the report of the Secretary, Prof. Francis W. Kelsey, of the University of Michigan, there are now 1,300 members of the Institute, each paying an annual fee of $10.00, with affiliated societies in Boston, New York, Baltimore, Pittsburg, Chicago, Detroit, Wisconsin, Cleveland, Connecticut, Missouri, Washington, Iowa, Pennsylvania, the Southwest, and Colorado. Of those, the societies in Boston, New York, Pennsylvania, Detroit, Washington, and the Southwest have more than 100 members each.

The objects of the Institute, as set forth in the original regulations, is stated to be, "for the purpose of promoting and directing archæological investigation and research, by sending out expeditions for special investigation, by aiding the efforts of independent explorers, by publication of archæological papers, and of reports of the results of the expeditions which the Institute may undertake or promote, and by any other means which may from time to time appear desirable."

ADDRESS BY PROF. CHARLES ELIOT NORTON

In a remarkable address given on the afternoon of December 28 by Prof. Charles Eliot Norton, through whose efforts the Institute was originally founded and who was its first president, he further stated the objects of the Institute in the following words:

The real object of the Archæological Institute is to strengthen the hands and hearts of those who hold to an America which shall be intellectually and morally not less great than she is materially. It may surprise some of you when I say that in the foundation of the Institute archæology was not directly its object, for we thought of it as an effort to resist the flood of vulgarity and barbaric luxury brought in by the rapid and enormous increase of wealth then beginning to overwhelm the country. We viewed it as more than an undertaking to dig up buried cities and consider the conditions of prehistoric barbarians. For, while of all races the Greeks attained to culture in the highest degree, of all peoples none ever needed culture so much as ours. We therefore laid the foundations of the Institute that it might contribute to the higher culture of the country.

PROF. CHARLES ELIOT NORTON

WORK OF THE INSTITUTE

Among the most important results of the work of the Institute have been the establishment of the American School of Classical Studies in Athens, the American School of Classical Studies in Rome, and the American School for Oriental Study and Research in Palestine.

According to the report of the school in Athens for 1903 and 1904, 22 colleges and universities, each paying an average of $200, united in its support, while altogether a total of $20,407.96 were expended in the field; $1,500 of this were expended in excavations at Corinth and $2,200 in fellowships for students carrying on special lines of study.

During the same time the school at Rome expended $15,688.79, having among its supporters 27 colleges and universities.

The school in Palestine was supported by 22 colleges and theological seminaries, with a total income of $8,768.03 and a balance on hand for excavation of $3,386.22.

At the same time through the active interest, especially of Dr. Charles F. Lummis, Secretary of the Society of the Southwest, renewed attention is paid to the preservation of American antiquities and to recording the folklore and customs of the rapidly decreasing aborigines, while a fellowship is maintained to promote study of the antiquities of Central and South America; and under the generous patronage of Vice-President Bowditch the interests of American Archæology are in every way receiving a fair degree of attention.

Among the encouraging incidents of the meeting was the announcement that the Carnegie Institute had appropriated an annual grant of $1,500, for 5 years, to each of the schools in Athens and Rome.

ADDRESS OF PRESIDENT ELIOT

In an address given by President Eliot, of Harvard University (in the Fogg Museum, Cambridge, on the afternoon of December 29), he congratulated the Institute upon the conception and scope of its work. He said in part:

It gives the widest possible interpretation to the word archæology; and this liberal construction accords fully with the interests of the University in the study of antiquities. Your labors have been manifold and fruitful; they have aroused interest in antiquity in a nation whose work, day by day, deals only with the present and the immediate future. I have sometimes wondered whether our civilization will leave anything for an Institute of Archæology 2,000 years hence.

Not long since while on my way to Boston, I passed by a brick yard and observed that each brick was stamped N. Eng. Br. Co. Here, I said, is an inscription which will go down to posterity and be of interest to archæologists 2,000 years hence. But my enthusiasm was dampened by the quick eyes of Mrs. Eliot, who called my attention to the fact that the N was wrong side up.

It is indeed painful to reflect that all the great piles which we use in our cities for the purposes of commerce are temporary in character; our stone wall, so called, are mere veneers of stone built up around a frame work of perishable steel and held on to the framework by iron wire. In a thousand years these piles will crumble into shapeless heaps of rubbish.

While delayed some time ago, for a few hours at a railroad station in North Africa, near what was apparently the dry bed of a stream coming down from the distant mountains, my attention was attracted by an old Roman bridge, which, in a series of arches 40 ft. high, spanned the stream, and which through nearly 2,000 years had stood intact and ready for use at the present day. The keystone of the middle arch had settled a few inches, but not sufficiently to impair the solidity of the structure. When I asked the station master what was the occasion of building so high a bridge over so insignificant a stream, his reply was that at certain seasons of the year the water rises to the top of those arches and sometimes overflows the very summit of the structure. Yet this Roman work had withstood the violence of the elements during these 20 centuries. Is there any American work which will be equally enduring?

Books printed in Mexico soon after the discovery of America are still fairly well preserved. But what can we expect of the books of the XX Century, printed upon paper made from wood pulp, destined to perish through dry rot in a comparatively short time?

Where then shall we find the material for the study of the archæologist 2,000 or 5,000 years hence? The only thing I can think of that is likely to last for the future archæologists is our subways. They have a chance.

I trust that out of your labors as they have penetrated the mass of our people, will come worthier buildings, worthier arts, and more permanent records of our civilization. I need not say that you are heartily welcome to this place. We have to call Harvard "old" in the United States. The oldest university in our country bids you welcome.

NOTES ON THE ADDRESS BY PROF. L. D. PATON

Among the papers of more general interest was one by Prof. L. D. Paton, of Hartford Theological Seminary, upon *Some Excavations on the Supposed Line of the Third Wall of Jerusalem.* This relates primarily to the questions in dispute concerning the correctness of the location of the Church of the Holy Sepulcher. Those who maintain the correctness of the present location suppose that the second wall, or the wall of Herod, followed an irregular line inside of the city from the Church of the Holy Sepulcher and that the present wall of the city is the third wall, built at a subsequent time. But Prof. Paton, with Prof. Edward Robinson, Dr. Selah Merril, and many others, believes that the existing is the second wall, and that the true location of the Holy Sepulcher is outside of that. In support of this theory attention is directed to the remains of an old wall, putting off from the Jaffa Gate to the northwest, which have been noted in excavating for various modern buildings, and which were specially described by Dr. Robinson as existing in his time at some distance outside the present city. But, unfortunately, all these remains have well-nigh disappeared at the present time. Prof. Paton's investigations seem to bring to light, however, what may have been a brief section of this wall, hewed out upon the face of solid rock, upon the north side of the city, in the vicinity of the site of the Holy Sepulcher, which was specially advocated by General Gordon.

NOTES ON THE ADDRESS OF DR. WILLIAM HAYES WARD

Rev. Dr. William Hayes Ward, of New York City, presented a highly illustrated paper, showing the two distinct sources from which the civilization of Babylonia was derived. Of these two sources one was in the south, where the country is a vast plain, with no mountains in sight, and the other in the mountainous country of the north. Mingled with the pictorial inscriptions natural to the plains of Babylonia are numerous pictorial representations incorporating conventional mountain scenery, and portraying various animals which are known only in the mountainous district to the north.

NOTES ON THE ADDRESS OF DR. CHARLES F. LUMMIS

The Primitive Music of the Southwest, illustrated by phonographic reproductions of Indian and old Spanish songs, was the subject of an address by Dr. Charles F. Lummis, Editor of *Out West,* and Secretary of the newly founded Society of the Southwest. A large audience was highly instructed and interested by this novel method of attaining some of the best results of anthropological research. The phonograph is now made to collect and preserve the fleeting notes of the songs and cries characteristic of the rapidly fading tribes of the Southwest. Much has already been lost beyond recall; but we may be thankful that so much has been preserved in the indestructible notes of the phonograph. It was a matter of surprise to observe how fully the notes and cadences and rhythm of these aboriginal songs and chants conform to the laws governing the artistic music of modern society. In some cases indeed the rhythm was as complicated and difficult as that employed by the more skillful modern composers, while harmony was by no means altogether absent.

NOTES ON THE ADDRESS OF MR. ALBERT M. LYTHGOE

New light has been shed upon the character of the aboriginal inhabitants of Egypt through the Egyptian Expedition of the University of California. Some of this was presented by Mr. Albert M. Lythgoe, of Harvard University, and the Boston Museum of Fine Arts, in a paper upon the *Early Prehistoric Cemetery at Naga-ed-Der.* This cemetery in lower Egypt extends from the vicinity of the river to the base of the limestone cliffs which line the valley. Here the burials go back to the very earliest times, even to that of the I Dynasty. The dryness of the climate and the composition of the soil is such that the bodies are preserved in a natural state of mummification—the dried flesh, skin, and hair often still adhering to the skeletons. Prof. Petrie had promulgated the theory that the civilization of Egypt was brought in by a light-haired race of conquerors or immigrants. But these investigations seem to show that on the contrary the civilization of Egypt is indigenous, since these earliest burials reveal that at that time Egypt was occupied by a dark-haired race, closely similar to that of later times.

ANCIENT IRRIGATION WORKS IN CENTRAL ASIA:—Prof. Pumpelly is reported to have made some very interesting discoveries of ancient irrigation works in the Trans-Caspian region of Asia. The area which is now a practical desert, except where irrigated, seems to have been made fertile by irrigation from very early times. The whole region which he is investigating promises to yield very important results bearing on the early history of Central Asia.

RESOLUTION FOR THE PRESERVATION OF AMERICAN ANTIQUITIES, PASSED BY THE AMERICAN ANTHROPOLOGICAL ASSOCIATION, DEC. 30, 1904:—*Resolved,* That a committee be appointed to represent the American Anthropological Association before the committees on public lands of the Senate and House at meetings of those committees held for the consideration of measures for the preservation of antiquities, and that the committee be instructed to advocate the acceptance and passage of the particular bill that seems in their judgment to cover the requirements of the case most fully, and that at the same time meets with the full approval of the Interior Department, which department has control of all public lands and whose agents in the field must be relied upon exclusively for custodianship and care of the antiquities in question.

EGYPTOLOGICAL NOTES:—Egyptologists have searched much for the story of the flood, but have never been able clearly to find it, as have the Assyriologists. The best they have been able to do is to point out a flood story. The latest contribution to the discussion of the subject is by Prof. Edward Naville before the Society of Biblical Archæology [see Proceedings, June and December, 1904]. The inconclusiveness of this distinguished Egyptologist's investigation of the subject is sufficiently indicated by his modestly choosing as a subject for his paper, *"The Mention of a Flood in the Book of the Dead."*

There has been much argument of late, especially by Dr. Winckler, for "two Egypts" in the olden time, one by the waters of the Nile and the other stranded in Northern Arabia. The suggestion has in it something which arouses a subtle suspicion of antiquity made to order. And it may perhaps be said in all fairness that such a conclusion is first approached from the side of Biblical criticism rather than Egyptology. According to one theory of Israel's early history, a more convenient and less important Egypt for Abraham's sojourn would fit in better. References to Northern Arabia as "Musri" are pointed to as evidences of "two Egypts." Whatsoever the future may reveal, the conclusion is, as yet, a *non sequitur.* The well-known domination of portions of Arabia by Egypt at many periods of Egyptian history is sufficient to account for such casual references to Arabia as Egypt, and reversing the argument, this domination is as large a conclusion as the premises warrant.

M. G. KYLE.